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Leaf Morphological Variation of *Acanthus* in Some Estuarine Areas of Cilacap

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Abstract. *Acanthus* is the only genus of family Acanthaceae which occupies mangroves habitat. Despite the importance of *Acanthus*, collection, characterization and improvement of its germplasm is limited. Hence, this will hinder its effective conservation and utilization. Therefore, the objective of this research was to identify morphological variation of *Acanthus* in some estuarine areas of Cilacap Central java in relation to habitat. The method used in this study was survey with stratified sampling. The variables measured included, leaf shape, size, apex, base, margin, color and spine. The results of this study indicated that the different location affect some morphological characteristics. Most of the *Acanthus* population observed in this study have direction of stem axial spines facing upwards, green, inflorescences spika, petals large, light violet. Similar to characters *Acanthus ilicifolius* has variations in leaf margin, leaf shape and size.

Key word : *Acanthus*, estuarine, leaf, morphology, variation, Cilacap

1. Introduction

Acanthus is included in the family Acanthaceae under subfamily Acanthoideae, commonly known as jeruju. This species is naturally found in wetland areas (wetland) at the mouth of river, as true mangrove vegetation and is classified as emergent aquatic plants. Where this type of habitat, *Acanthus* is a gregarious plant that is very common along the banks of estuaries and lagoons, and in marshy land and mangroves close to the seashore. It is rarely found inland. *Acanthus* is derived from Greek word „Acantha“ which means thorn or thistle, referring to spiny leaves of some species [1]. With regarding this aspect, due to the dominance of sea holly in mangrove area, it can be used as an indicator of the extent of environmental pollution and damage in the mangrove ecosystem [2]. In Malaysia, the seeds of *Acanthus ebracteatus* were used to expel intestinal worms, the root part is used to treat shingles while a decoction of 150 g of roots of *Acanthus ilicifolius* also useful to treat cancer, asthma and to relieve cough [3]. According to Polidoro in [4], the genus *Acanthus* consists of four species viz., *A. ebracteatus* Vahl, *A. ilicifolius* L., *A. volubilis* Wall. and *A. xiamenensis* are known from mangrove communities and are classified as true mangrove species. *A. ilicifolius* and *A. ebracteatus* have similar vegetative characteristics and the difference between them is the presence or absence of bracteoles which are often lost at anthesis, and many people have been wary when making identifications. Among the two species of *Acanthus* the taxonomical distinction between *A. ilicifolius* and *A. ebracteatus* still not clear in India [5]. There are some problems such as the confusion between *A. ilicifolius* and *A. ebracteatus* both species show some confusing characteristics some leaves of *A. ilicifolius* a lot showed variations [4]. Leaf is one of the plant organs that change shape according to the condition environment where the plant lives. The common changes of the leaves are



the size, and the shape. Morphological characterization of a species is very useful in the separation of populations into different morphotypes and proper utilization of genetic resources in plant breeding programmes[6]. Based on this This study was aimed at determining leaf morphological variations *Acanthus* in relation to habitat

2. Methods

This research was conducted in Cilacap Regency by using survey method with purposive sampling technique. The samples were taken from Tritih mangroves forest, River Tipar, Kamulyan village, River Bengawan, Logending Beach which are locate in Cilacap Regency. Plant collections were made of all *Acanthus* taxa encountered from the range of sites visited. For each *Acanthus* species both numeric and multistate attributes of a wide range of vegetative and reproductive morphological characters. The sample identification was done at laboratory of plant taxonomy Fakultas Biologi Unsoed. Fourteen quantitative characters were measured including leaf length, leaf width, leaf base, leaf apex leaf margin, petiole length, spines, petal width, were observed from individuals at each site. The data were analyzed descriptively based on the morphological characteristics.

3. Results

Based on field observation obtained *Acanthus*, leaves morphological identification result shows kualitatif diversity with morphological variations on the leaves as described below (figure 1).

Table 1. Morphological characters of *Acanthus* in Cilacap regency

No	Characteristics	Habitat				
		Tritih mangrove	River Tipar	Kamulyan Village	River Bengawan	Logending Beach
1	Leaves	Simple	Simple	Simple	Simple	Simple
2	Leaf base	cuneate	acuminate	Cuneate	acute	Cuneate
3	Leaf apex	Acuminate	acuminate	Acuminate	acuminate	acuminate
4	Leaf shape	oblong	Oblong	Lanseolate	lanseolate	lanseolate
5	Leaf margin	Pinatilobe and integer	Integer, pinatilobe	Pinatilobe	pinatilobe	Pinatilobe
6	Leaf lenght	±17,5 cm	±19,8 cm	±14,6 cm	±16,6 cm	±18,6 cm
7	Leaf width	±5,7 cm	±5,4 cm	±3,2 cm	±3,7 cm	±4,2 cm
8	Petiole lenght	±0,4 cm	±0,5 cm	±0,4 cm	±0,6 cm	±0,5 cm
9	Spines	Present, absent	Present	Present	Present	Absent
10	Stem	Cylindrical	Cylindrical	Cylindrical	Cylindrical	Cylindrical
11	Stem color	Light green	Green	Ligt green	Ligt green	Green
12	Stem texture	Smooth	Smooth	Smooth	Smooth	Smooth
13	inflorescence	Racemose	Racemose	Racemose	Racemose	Racemose
14	Flower location	terminal	Terminal	Terminal	terminal	Terminal
15	Petal color	Pale purple	Purple	Pale purple	Purple	Violet

A total of 15 vegetive characters were observed in *Acanthus*. Based on the overall characters observed, 10 characters are varied, while 5 characters are not. All sample have the same vertical stems, Cylindrical, stem tekture smooth, simple leaf, leaf apex acuminate, flower terminal and Inflorescentia racemosa. spines at the base of the petiole always present and facing upward (Table 1).

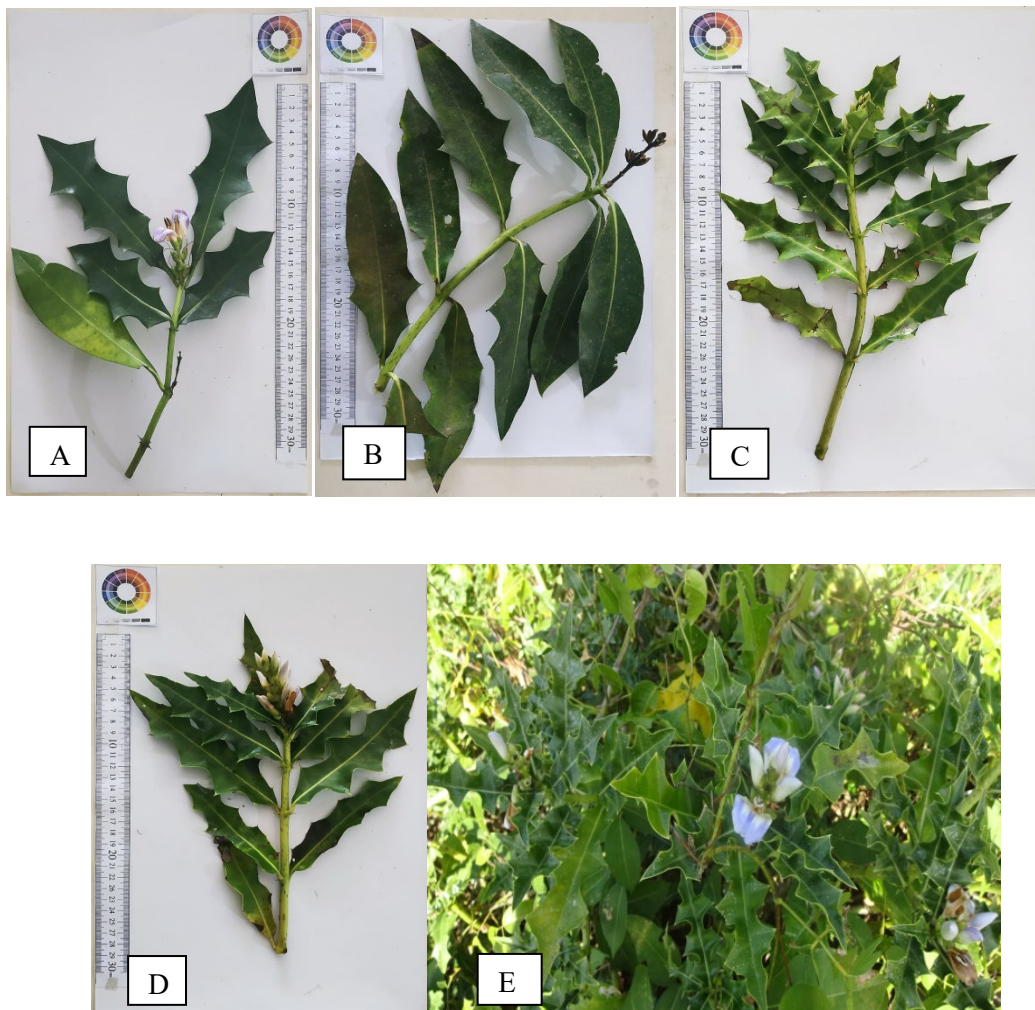


Figure 1. Characteristic of *Acanthus* leaves from various location: A. Tritih mangrove forest, B.River Tipar, C.Kamulyan village, D River Bengawan, E Logending Beach

Acanthus ilicifolius grows in groups, Generally grows on river banks, tidal areas, low wetlands and mangrove forests. True mangrove plants, but also found along fresh water [2].

4. Discussion

Observation and identification of the morphological characteristics of *Acanthus* from different habitats have different leaf morphological characters (Table 1). showed a diversity of qualitative characters, leaf base acute, acuminate, cuneate, leaf shape oblong and lanceolate, leaf margin entire and pinnately lobbed with sharp spines at each lobe's tip. Diversity also exists in quantitative traits including leaf length 14,6-19,8 cm, leaf width 3,2- 5,7 cm. At the location of the Tipar River, *Acanthus* has anisofilli leaves (one branch there are two leaf shape) that is integer and pinnatilobus. There is morphological variation if environmental factors are more dominant than genetic factors. Plants will not show significant genetic variation if genetic factors predominantly affect these plants[7]. According to [8] the level of genetic diversity is an indication of the plant's adaptability to its growing environment. Plant genetic diversity is caused by several factors, i.e., environmental variations, gene flow, and gene mutations. Environmental variety caused not only species diversity but also diversity within

species[9]. Types of plants that have a wide distribution of nature will have high genetic diversity. The variation between access can be related to genetic history, eco-geographical origin, etc.[10].

Based on the analysis of the description, it turns out that the *Acanthus* in Cilacap Regency is *Acanthus ilicifolius*, in accordance with research [4] there is *Stem*: thick, green, light green or purple, sparsely branched and stem axial spine either present or absent, if present always facing upward *Leaves*: simple, opposite, lanceolate to broadly lanceolate, margin either entire or spiny and dentate, leaf base attenuate, leaf tip acute and narrowly pointed with or without spiny edge, presence of spines with greater sunlight and exposure, size variable, 6-30 x1.5-6 cm, ratio of length to width is greater than 2; petiole short, green, 0.5-2 cm long. *Inflorescences*: both terminal. The species status of *A. ebracteatus* is often doubted by the botanists since the two species viz., *A. ilicifolius* and *A. ebracteatus* have similar vegetative characteristics and the difference between them is the presence or absence of bracteoles which are often lost at anthesis, and many people have been wary when making identifications (Barker 1986 in[4]).

Cilacap mangrove forest in an open area is dominated by *Acanthus ilicifolius* species, . The dominance occurs due to the tree-type stands that have been reduced so that sunlight reaches the surface of the soil causing these liana plants to flourish because they are exposed to considerable amount of sunlight. The existence of the dominance of these species indicates the decrease in biodiversity of the mangrove forest, however *A. ilicifolius* in addition to being an indicator plant (phytoindicator) can also be used in quantitative quality monitoring of an environment [2].

5. Conclusion

The *Acanthus* population observed in this study have direction of Stem axial spines facing upwards, with sharp spines at each lobe's tip, racemosa inflorescentia, petals light violet Similar to characters *Acanthus ilicifolius*. Based on observations from several locations *Acanthus ilicifolius* has variations in margin folii, leaf shape, leaf size, and spines

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